

Internal Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

February 12, 1985

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to the public by:

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Technical Information Officer Date
Oak Ridge K-25 Site

R. S. Lay

Radiation Incident Report - Air Sample

DATE AND TIME INCIDENT OCCURRED: This response covers Incident Report Numbers 3, 4, 5, 6, 7, 8, 9, 10 and 11. The dates and times are from 8:34 a.m. on 1-18-85 to 8:39 a.m. on 1-30-85. The proper chronological sequence for these samples is as follows:

K-413 Pump Room - 5, 3, 7, 4, 8, and 9
K-413 Scale Room - 6, 10, and 11

INVESTIGATION FINDINGS: Late on Friday, February 1, 1985, the K-29 Area received a "Radiation Incident Report" letter with Incident Report #3 attached. Since the result was only 4.5 dpm/m³ above the Initial Action Level of 22 dpm/m³, investigation of the incident was postponed until Monday, February 4, 1985. (Incident Report #3 was for the time period 8:34 a.m. on 1-22-85 to 8:45 a.m. on 1-23-85). The investigation was promptly begun Monday morning.

Late Monday morning [REDACTED] of the Health Physics Department delivered a second "Radiation Incident Report" letter with Incident Reports #4, #5, and #6 attached. The time period for each of these reports were as follows:

- #4 - 8:28 a.m. on 1-25-85 to 8:52 a.m. on 1-28-85 (Pump Room)
- #5 - 10:20 a.m. on 1-18-85 to 8:34 a.m. on 1-22-85 (Pump Room)
- #6 - 8:29 a.m. on 1-25-85 to 8:53 a.m. on 1-28-85 (Scale Room)

These three incident reports were immediately added to the investigation. The data thus presented indicated three discreet incidents had occurred. The first seemed to have occurred in the K-413 pump room between 10:20 a.m. on 1-18-85 and 8:45 a.m. on 1-23-85. The second incident seemed to have occurred in the K-413 pump room between 8:28 a.m. on 1-25-85 and 8:52 a.m. on 1-28-85. The third incident seemed to have occurred in the K-413 scale room between 8:29 a.m. on 1-25-85 and 8:53 a.m. on 1-28-85. The time between 8:45 a.m. on 1-23-85 and 8:28 a.m. on 1-25-85 was apparently free of any uranium releases in K-413. The investigation of these "three incidents" did not reveal any unusual activities or operations that could account for the elevated levels of airborne uranium.

Late in the afternoon of Monday, February 4, 1985, a memo was received from W. R. Golliher via the electronic mail system. This memo listed nine air

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J.C. Nelson
ADC Signature

4/6/95

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samples taken in K-413 that were above the initial action level. In fact, two of the nine samples exceeded the respiratory protection level of 222 dpm/m³. It was readily apparent that the airborne uranium levels in K-413 had been elevated continuously since 1-18-85. This indicated a single, ongoing UF₆ leak rather than nine separate release incidents.

The obvious source of the leak seemed to be the liquid UF₆ drain line. The System 3 PW Unit was operating, draining to the north scale position. The product cylinder was moved to the south scale position. The north scale position's drain line was placed on leak rate. This was done early on the 4-12 shift on Monday, February 4, 1985. Additionally, Health Physics personnel working during the 4-12 shift were requested to obtain air samples in the south pump room where the System 3 compressor is located. The leak rate of the north scale drain line indicated that it contained no leaks. The air samples taken in the south pump room indicated airborne uranium was present. As a precautionary measure, both the north and south pump rooms of K-413 were made respirator areas. No elevated levels of airborne uranium were found in the K-413 scale room.

Early on the day shift Tuesday, February 5, 1985, further air sampling was performed in K-413. Airborne uranium was found in both pump rooms and in the control room. The respirator requirement was added to the control room.

Since the north drain line was OK; a visual inspection of the System 3 process gas piping was conducted. Trace amounts of UO₂F₂ were found on the handwheel of a valve in the condenser vent system. System 3 was taken offstream, evacuated and placed on leak rate. The leak rate indicated that a very small leak was present in the system. System 3 was purged to a UF₆ negative and shut down. System 1 was placed in service.

Once System 3 was shut down, all of the doors in K-413 were opened and the exhaust fans were turned on. After the building was closed up again, the subsequent air samples indicated no airborne uranium present. Air samples taken later in the afternoon, once System 1 had been operating, also indicated no airborne uranium. The respirator requirements were lifted.

NUMBER OF EMPLOYEES INVOLVED: A total of 24 operators, janitors, Health Physics personnel, and maintenance mechanics could have been involved during the duration of the incident. They are listed below:

NUMBER OF EMPLOYEES WEARING RESPIRATORS: The following ten employees wore respirators during some or all of the time of the incident investigation.

NUMBER OF EMPLOYEES LEAVING URINE SAMPLES: The following seventeen employees left urine samples during or after the investigation.

The uranium level in the urine samples for [REDACTED] and [REDACTED] was above the ORGDP investigation level of 0.05 mg/l. Follow-up samples from both employees taken on February 6, 1985, were below the 0.05 mgU/l investigation level.

CORRECTIVE ACTION: Once the System 3 PW station was purged and shut down and the System 1 PW station was in service, steps were begun to find and repair the leak. Mechanical maintenance personnel stripped the insulation off the System 3 condenser vent piping. There were fairly large accumulations of UO_2F_2 on the piping under the insulation. This indicates that the leak had probably existed for some time. Chemical Operations personnel removed the UO_2F_2 deposits and cleaned the floor, stairs and electrical switch gear in the area.

Once all the clean-up activities were complete, the System 3 vent header was pressured to 5 psig by the Cascade Operators. Soap testing indicated a small leak in a weld on the high pressure side of the vent control block valve. Additionally, the valve bonnet of this same valve, a Crane S type, was found to be plugged with UO_2F_2 which could indicate a valve bellows leak. At the time of the writing of this report, repair efforts are still underway.

CONCLUSIONS: There are several conclusions that the investigators noted. These are:

1. The Health Physics air samplers can detect UF_6 releases at much lower concentrations in the air than are detectable by the smoke detectors. The K-413 smoke detectors were operating normally throughout this event.

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2. The communication of air sample results to the field personnel needs to be speeded up. During this event, the laboratory equipment used to analyze the air samples was out of order. Once the equipment was repaired, the accumulated air samples were not analyzed in chronological order. The combination of the delay in receiving analysis data, and the fragmented order in which it was received, led to some wasted time in determining the leak source.
3. Some operator concern was generated by poor communication of the supervisory urinalysis results. This has been done in the past with varying consistency. Each employee who is requested to leave a supervisory urine sample should be told the result of the analysis, even if it is below the ORGDP investigation level.
4. It would be beneficial if an air sampler could be found that would give real time results at a reasonable cost.

N. G. McRae

N. G. McRae, K-502-3, MS 303 (4-9004)

NGM:tml

cc: M. O. Beeler
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